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Superovulatory response, embryo recovery and ovarian steroids in Jersey cows treated with different FSH preparations and their routes of administration

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ABSTRACT

A group of six regularly cycling Jersey cows were superovulated 18 times with (I) Folltropin-V 400 mg. NIH (Veterepharm, Inc. Canada) given in 8 equally divided intra muscular dose for 4 days, twice daily, (II) a single sub-cutaneous injection of Folltropin-V 400 mg. or (III) Super-ov 75 Units (Ausa Int.) in 8 divided descending intra muscular doses for 4 days. A luteolytic dose of $PGF_2\alpha$ (PG) was injected 60 latter. The cows exhibiting estrus after 36-48 hrs. were inseminated 2-3 times at 12 h. intervals. All the cows were flushed on day 7 post-breeding using DBPS (Sigma) and SOV (superovulatory) response and embryo yield recorded. Blood samples collected before, during and after treatment, were analysed for Progesterone (P_4) and Estradiol-17β (E_2) by standard RIA techniques. The results revealed that Folltropin and Super-ov treatment yielded 7.83±2.41 and 70..±3.06 corpora lutea, (CL) and 12 and 9 transferable embroys, respectively, when administered intra muscularly in divided doses, whereas, single sub-cutaneous Folltropin V administration yielded 4.34 ±1.17 Cl and 3 embryos, respectively. The serum E_2 levels were high (85.03±36.94, 35.00±6.10 and 21.97±9.17 in groups I, II and III, respectively) on the day of SOV estrus. P_4 levels elevated on the day of embryo recovery (5.57±1.39, 11.21±3.96 and 11.80±6.57), in groups I, II and III, respectively.

Keywords: Superovulation, FSH, Embryos, Progesterone, Estradiol-17β

Superiority of FSH over PMSG as super-ovulatory gonadotropin in cows is well documented (Elsden, *et al.*, 1978, Monniaux, *et al.*, 1983, Dutta, *et al.*, 1992). However, its short half-life necessitates multiple injections over a period of 3-4 days. Single subcutaneous administration of FSH yielded promising results (Mishra *et al.*, 1992, Siddiqui *et al.*, 1996). Present investigation documents the results with two FSH preparations (Folltropin V and Superov) administrated by single sub-cutaneous or intra-muscular route and one preparation (Folltropin V) by sub-cutaneous route.

MATERIALS AND METHODS

Six regularly cycling Jersey cows were super-ovulated 18 times using either Folltropin-V or Super-ov administered during their mid-luteal phase.

Group I: Folltropin-V 400 mg. NIH (Ventrepharm Inc., Canada) in 8 equally divided dosages for 4 days, intra muscularly.

Group II : Folltropin-V 400 mg. NIH, single sub-cutaneous administration.

Group III: Super-ov 75 units (Ausa Int., USA) in 8 divided, descending dosages, twice daily for 4 days, intra muscularly.

A luteolytic dose of $PGF_2\alpha$ (PG) was injected 60 h. later. The cows exhibiting estrus were inseminated 2-3 times during the estrus at 12 h. intervals. All the cows were flushed on day 7 post-breeding using DPBS (Sigma) with 0.1% BSA and moved to holding media (DPBS with 0.4% BSA) for morphological study. Blood collected before, during and after treatment were analysed for Progesterone (P_4) and Estradiol - 17β (E_2) using RIA kits (DPC, USA). The data were analysed statistically as per the methods of Snedecor and Cochran (1971).

RESULTS AND DISCUSSION

The time required for exhibition of SOV estrus response and embryo recovery rate are presented in Table 1. The SOV response (No. of CL) was

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Table 1: Superovulatory response and embryo yielded in Jersey cows treated with different routes of gonadotropin administrations.

Treatment Group	Time of onset of estrus (h)	SOV response		Embryo yield		
		CL	AOF	TOR	TER	TRE
I	26.00±6.51	7.83±2.41	1.17±0.60	9.00±2.80	18	12
II	40.00±5.93	4.34±1.17	0.66±0.42	5.00±1.46	6	3
III	34.00±7.84	7.00±3.06	0.83±0.54	7.83±2.84	18	9

TOR=Total Ovarian Response, TER = Total Embryo Recovery, TRE = Transferable Embryo Recovery

Table 2: Serum Progesterone (ng/ml) and Estradiol-17β (pg/ml) levels in Jersey cows treated with gonadotropins by different routes.

Treatment Group	Hormones analysed	Experimental Days		
		Pre-treatment (D_{10})	SOV estrus (D_0)	Embryo Recovery (D_7)
I	P_4	1.60±0.37	0.59±0.14	5.77±1.39
	E_2	7.72±2.50	85.03±36.94	8.19±2.48
II	P_4	4.51±1.46	0.66±0.22	11.22±3.96
	E_2	12.26±4.64	35.00±6.10	8.19±3.70
III	P_4	6.0±1.22	1.93±0.65	11.81±6.57
	E_2	15.79±8.17	21.97±9.17	17.60±7.12

higher in cows treated with divided dose of FSH (Follitropin-V and Super-ov-7.83±2.41 and 7.00±3.06, respectively) as compared to single s/c inj. of Follitropin-V (4.34±1.17), and so was the embryo recovery (12, 9 and 3, respectively). The SOV response and embryo recovery observed in the present study were comparable with the earlier reports of Bevers and Diemen (1987), Mishra *et al.* (1992), Pawshe *et al.* (1992), Totey *et al.* (1992) and Ansari and Kumarsan (2001). However, lower SOV response and embryo recovery particularly in cows treated with single sub-cutaneous administration in the present study might be because of luteinisation of anovulatroy follicles (AOF) or ovulations occuring over a longer period of times as it occurs in case of PMSG. Siddiqui *et al.* (1996) reported higher SOV response and embryo recovery with single subcutaneous injection of FSH dissolved in plyvenyl pyrolidone (PVP) to ensure slow absorption of FSH from the site of injection.

Pattern of elevated levels of estradiol on the day of SOV estrus and 2-3 folds higher progesterone levels on the day of embryo recovery in all the three treatment groups (Table 2) in the present study confirmed multiple ovulations. Similar patterns of ovarian steroids were also reported in crossbred cows (Chauhan *et al.*, 1994).

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